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GROUP OF EXPERTS ON EXPLOSIVES

REPORT OF THE GROUP OF EXPERTS ON EXPLOSIVES ON ITS NINETEENTH SESSION

(6-10 August 1979)

Contents

	Paragraphs
ADOPTION OF THE AGENDA	2
ELECTION OF CHAIRMAN	3
GENERAL MATTERS	4 - 7
REVISION OF CHAPTER 15 WITH REFERENCE TO CLASS 1	8 - 11
COMPLETION OF SYSTEM OF TEST PROCEDURES FOR DETERMINING THE ASSIGNMENT OF SUBSTANCES AND ARTICLES TO CLASS 1	12 - 19
CONFIRMATION OF THE VALIDITY OF THE SYSTEM OF TEST PROCEDURES BY EXCHANGING RESULTS OF TESTS PERFORMED ON THE BASIS OF THE REFERENCE STANDARDS	20 and 21
INCORPORATION OF THE SYSTEM OF TEST PROCEDURES IN THE REVISED CHAPTER 4	22 - 29
TREATMENT OF SUBSTANCES WITH EXPLOSIVE PROPERTIES BUT APPROPRIATE TO OTHER CLASSES	30 - 33
(a) Forbidden substances	30
(b) Other classes	31 - 33
ADDITIONS TO THE ENTRIES AND PACKING SHEETS FOR CLASS 1	34 - 40
REVISION OF CHAPTER 10	41 - 44

Paragraphs

FORMULATION OF PROVISIONS FOR THE LOADING OF INTERMODAL CONTAINERS WITH SUBSTANCES AND ARTICLES OF CLASS 1, AND OF PROVISIONS GOVERNING THE CARRIAGE OF SUCH CONTAINERS 45

FUTURE WORK 46

ADOPTION OF THE REPORT 47

*

* *

Annex 1 - Chapter 2. LIST OF DANGEROUS GOODS MOST COMMONLY CARRIED

Chapter 3. SPECIAL PROVISIONS RELATING TO INDIVIDUAL SUBSTANCES AND ARTICLES

Annex 2 - Chapter 4. SPECIAL RECOMMENDATIONS RELATING TO CLASS 1

Annex 3 - Chapter 4. SPECIAL RECOMMENDATIONS RELATING TO CLASS 1 - FLOW CHART

Annex 4 - Chapter 10. SPECIAL RECOMMENDATIONS ON PACKING FOR CLASS 1 (ST/SG/AC.10/4/Add.3)

Annex 5 - Index

REPORT

1. The Group of Experts on Explosives held its nineteenth session at Geneva from 6-10 August 1979. Experts from the following countries participated in its work: Canada; France; Italy; Germany, Federal Republic of; United Kingdom; Union of Soviet Socialist Republics; United States of America. The International Civil Aviation Organization (ICAO) also took part in the Group's work. Upon invitation from the Group of Experts on Explosives, experts from the Netherlands also participated in the work. An observer from the Harmonized Commodity Description and Coding System Advisory Council (HSAC) participated in this session, at the invitation of the secretariat.

ADOPTION OF THE AGENDA

2. The Group of Experts adopted the provisional agenda prepared by the secretariat, ST/SG/AC.10/C.1/R.25 and Add.1.

ELECTION OF CHAIRMAN

3. On the proposal of the expert from the United States of America supported by the experts from Canada and the Union of Soviet Socialist Republics Mr. R. R. Watson (United Kingdom) was unanimously elected Chairman.

GENERAL MATTERS

4. The Chairman referred to critical comments made by some Governments at the last meeting of IMCO Sub-Committee on the Carriage of Dangerous Goods concerning the work of the United Nations Committee of Experts and its subsidiary bodies. There had been complaints of too frequent changes in the Recommendations sometimes revoking earlier decisions. The same uneasy feelings had been reported in the Joint IRO/ADR Committee.

5. The IMCO Sub-Committee on the Carriage of Dangerous Goods had expressed the opinion that many of these objections could possibly be avoided if the national delegations to the meetings of the Committee of Experts included experts with experience in maritime transport.

6. The Group of Experts acknowledged some of the criticism mentioned and agreed in particular to indicate in future if proposed changes are of an urgent nature and should therefore be implemented by Governments and Transport Organizations as soon as possible or if implementation of such changes is not of a critical nature.

7. The majority of the Group of Experts felt that there was no need to specify a so-called "maturing period" with regard to the implementation of the United Nations Recommendations and agreed that they should be continuously updated and that in future an attempt should be made to avoid whenever possible radical and controversial changes.

REVISION OF CHAPTER 13 WITH REFERENCE TO CLASS 1

8. The expert from the United Kingdom introduced document ST/SG/AC.10/C.1/R.37 concerning the revision of Chapter 13.

9. The Group of Experts agreed that the proper shipping name which will in future appear in Chapter 2 of the Recommendations in capitals should be identical to the authorized short name. It was felt that also for classes 2 to 9 the alternative names should appear in brackets.

10. The expert from the United States of America explained the need for marking and labelling packagings containing dangerous goods. After a detailed discussion in which all experts participated as well as the Chairman and some members of the Committee's editorial group, the Group of Experts agreed that it would be satisfactory if in future for class 1, the class, division and compatibility group letter, i.e. the full classification code, should appear on the label, preferably in the lower half.

11. In this connexion it was suggested that the secretariat be authorized to allocate United Nations serial numbers to new substances in the interim period between sessions of the Committee. However, it was felt that this procedure would impose an additional workload on the secretariat. The Group of Rapporteurs is invited to consider this proposal for classes other than class 1.

COMPLETION OF SYSTEM OF TEST PROCEDURES FOR DETERMINING THE ASSIGNMENT OF SUBSTANCES AND ARTICLES TO CLASS 1

12. The Chairman summarized the work done so far on this subject and pointed out that the Group of Experts should be able to complete its task in the near future.

13. It was felt that a set of test criteria and methods was needed for classifying articles and substances of class 1. Although a relatively strict procedure should be established, the experience of experts and testing laboratories should also be taken into consideration.

14. The expert from the Federal Republic of Germany mentioned problems that were encountered in connexion with the term "bulk transport". The experts from the United Kingdom, the United States of America and the Union of Soviet Socialist Republics explained their understanding of this term with regard to the transport of explosives substances without packagings.

15. The Group of Experts considered in detail the flow charts described in documents ST/SG/AC.10/C.1/R.42,-/R.47, and-/R.48, taking into account the work which had been done by the small group. This discussion resulted in agreement on a new flow chart which is presented in annex 3 to this report.

16. Afterwards the Group of Experts discussed briefly documents ST/SG/AC.10/C.1/R.35 (Canadian Thermal Stability Test) and-/R.44 (United Kingdom U-Tube Test). The Group of Experts agreed that these tests were examples of test series 2(c) and 2(e) respectively but took no decision relating to their suitability because of lack of information e.g. criteria.

17. It also took note of documents ST/SG/AC.10/C.1/R.50 submitted by the expert from the Federal Republic of Germany in which detailed technical data of the EXTEST standard detonator (blasting cap) were described and agreed that this detonator is an example for a standard detonator which may be used in relevant tests in the classification scheme.

18. The Group of Experts then discussed the tests listed in document ST/SG/AC.10/C.1/R.26, annex 2, and accepted some minor changes to the list. This resulted in rearrangement and renumbering of test series 1. The whole new list of tests is presented in annex 2 to this report.

19. The expert from the United States of America indicated that an informal meeting was planned in the United States of America for the spring of 1980, in order to further advance the work on test methods for explosives. The following matters will be considered at this meeting:

(a) Critical examination of the ability of the test methods shown in document ST/SG/AC.10/C.1/R.26, annex 2 to determine the specified parameters;

(b) preliminary consideration of criteria for acceptance/failure associated with each of the test methods listed;

(c) proof of the system of test procedures using test data for reference standards and substances already classified.

He extended an invitation to all interested members of the Group, or observers, to participate in this meeting.

CONFIRMATION OF THE VALIDITY OF THE SYSTEM OF TEST PROCEDURES BY EXCHANGING RESULTS OF TESTS PERFORMED ON THE BASIS OF THE REFERENCE STANDARDS

20. The Group of Experts had a preliminary discussion on the use of certain substances as reference standards for the various test methods and agreed to come back to this item after the work on test methods and flow charts had been finalized.

21. The expert from the United Kingdom agreed to prepare a paper for the next session.

INCORPORATION OF THE SYSTEM OF TEST PROCEDURES IN THE REVISED CHAPTER 4

22. The editorial group set up to consider revision of chapter 4 studied a number of amendments listed in documents ST/SG/AC.10/C.1/R.29, -/R.31, -/R.32 and -/R.40. The new text as approved by the Group of Experts is shown in annex 2 to this report.

23. The expert from the United States of America agreed to study further the problem of the correct classification for "Cartridges for Weapons" and submit a paper on this question if appropriate.

24. He also considered that the term "small arms ammunition with a bursting charge" which however, is contradictory, can be used in view of the relevant international convention on this subject.

25. On the proposal of the expert from Canada, the Group of Experts agreed to revise the descriptions of substances and articles shown in paragraph 4.68.

26. The expert from the Union of Soviet Socialist Republics suggested the cross-referencing of the entries in paragraph 4.68 with substances and articles in Chapter 2 and for listing in the index. Since this question requires further study the Group of Experts decided to return to this problem at a later session.

27. The amendments to chapter 4 as adopted by the Group of Experts are shown in annex 2 to this report.

28. The Group of Experts noted that document ST/SG/AC.10/C.1/R.8/Rev.1 superseded both documents ST/SG/AC.10/C.1/R.8 and ST/SG/AC.10/C.1/R.23. It further noted that outstanding editorial work on the revision of Chapter 4 would involve the inclusion of the two changes made by the Committee (ST/SG/AC.10/4/Add.1, (annex 4)), the annex of document ST/SG/AC.10/C.1/R.8/Rev.1, the finalized flow chart with ISO symbols and designation of tests, the additions to the glossary and the other changes which relate to Chapter 4 adopted by the Group of Experts during the nineteenth session.

29. The Group of Experts invited the Chairman and the expert from the Federal Republic of Germany to assist the secretariat in producing as soon as possible a complete draft text of Chapter 4 which would be issued for early study by the Group of Experts, with a view to its adoption at the twentieth session and submission to the Committee of Experts in 1980.

TREATMENT OF SUBSTANCES WITH EXPLOSIVE PROPERTIES BUT APPROPRIATE TO OTHER CLASSES

(a) Forbidden substances

30. The expert from the United Kingdom introduced a document concerning the development of a list of forbidden substances (ST/SG/AC.10/C.1/R.33). The Group of Experts had a preliminary discussion on the subject and the expert of the United States of America circulated a copy of a proposed national rule making. He also agreed to prepare a paper containing introductory points for such a list for the twentieth session.

(b) Other classes

31. The Group of Experts noted with interest document ST/SG/AC.10/C.1/R.34 submitted by the expert from Canada concerning the introduction of a new division 1.6 in class 1 and agreed to resume consideration of this subject at its next session.

32. The experts from the Union of Soviet Socialist Republics and Italy expressed general sympathy with the proposal and referred to safety aspects and possible implications for other regulations.

33. With regard to the classification of musk xylene, the expert from the United Kingdom introduced a proposal contained in document ST/SG/AC.10/C.1/R.41 Taking into account all previous data, and that in the recent bonfire test described in document ST/SG/AC.10/C.1/R.41, no explosion occurred, the Group of Experts finally agreed not to list this substance in class 1 but to submit it for consideration to the Rapporteurs at their next session in February 1980, for inclusion in Division 4.1 with a special provision relating to packaging.

ADDITIONS TO THE ENTRIES AND PACKING SHEETS FOR CLASS 1

34. The Group of Experts re-affirmed its position taken earlier in the session with regard to the use of proper shipping names and the enlargement of the Glossary.

35. For Barium azide, wetted United Nations No. 0224, the Group of Experts agreed to follow the same entry as for United Nations No. 1571 (see annex 1 to this report).

36. The Group of Experts adopted the proposal submitted by the expert from the United States of America (ST/SG/AC.10/C.1/R.27) to amend the present wording for compatibility groups B and D subject to a modification.

37. A proposal of the expert from Canada regarding alcoholic solutions of nitro-glycerine (ST/SG/AC.10/C.1/R.30) was not adopted. The expert from the Federal Republic of Germany agreed to circulate information on this subject and the expert from Canada offered to consider the preparation of a new document for the next session of this Group.

38. The expert from Canada introduced document ST/SG/AC.10/C.1/R.33 proposing to delete the use of secondary labels for explosive substances and articles. Although there was a certain agreement to restrict in general the use of secondary labels the Group of Experts did not accept this proposal and felt that the matter should be considered by the Group of Rapporteurs.

39. The expert from the Union of Soviet Socialist Republics underlined that explosives which are toxic due to their volatility should bear the poison label (Division 6.1).

40. Finally, the Group of Experts considered two proposals (ST/SG/AC.10/C.1/R.43 and R.49) submitted by the experts from the United Kingdom and the Federal Republic of Germany respectively. The new text as amended had been adopted by the Group of Experts and is shown in annex 1 to this report.

REVISION OF CHAPTER 10

41. For the consideration of this item, the Group of Experts had before it the following documents, parts of ST/SG/AC.10/C.1/R.29, -/R.36, a note on palletized loads circulated during the meeting by the expert from the United Kingdom and comments received from IMCO.

42. The expert from the Union of Soviet Socialist Republics informed the Group of Experts that during the discussion of document ST/SG/AC.10/R.30 in December 1978 certain proposals had not been considered fully by the Committee of Experts; the Group therefore agreed to have these proposals considered during the present session.

43. It was felt that most of these proposals were of an editorial nature and the secretariat was instructed to incorporate those relevant changes in the new version of chapter 10 (ST/SG/AC.10/4/Add.3, (annex 9)). The proposals of a more substantial nature which were adopted by the Group of Experts are shown in annex 4 to this report.

44. The Group of Experts also adopted the proposals submitted by the expert from the Federal Republic of Germany (ST/SG/AC.10/C.1/R.36) to include in packing method E 9(b) the use of plastics bags. See annex 4 to this report.

FORMULATION OF PROVISIONS FOR THE LOADING OF INTERMODAL CONTAINERS WITH SUBSTANCES AND ARTICLES OF CLASS 1, AND OF PROVISIONS GOVERNING THE CARRIAGE OF SUCH CONTAINERS

45. The Chairman explained the relevance of the International Convention for Safe Containers (CSC) and described the reaction of IMCO's CDG Sub-Committee in June 1979 when the United Kingdom preferred stringent conditions to be superimposed on the CSC requirements in the case of explosives goods (ST/SG/AC.10/C.1/R.45, paragraph 4 refers). The Group of Experts discussed document ST/SG/AC.10/C.1/R.39 by the United Kingdom and document ST/SG/AC.10/C.1/R.46 by the United States of America. Some experts considered the CSC performance standard for the construction of freight containers to be sufficient for any dangerous goods though recognising that special operating conditions might be imposed by national authorities. Other experts were hesitant to commit themselves at this time. The Group of Experts agreed to adopt a modified version of the proposal in document ST/SG/AC.10/C.1/R.46 as a basis for further study of the problem. The text is reproduced in annex 2 of this report.

FUTURE WORK

46. The Group of Experts was informed that its next session will be held tentatively from 4 to 8 August 1980.

ADOPTION OF THE REPORT

47. The Group of Experts adopted the report of its nineteenth session together with its annexes.

Annex 1

Chapter 2. LIST OF DANGEROUS GOODS MOST COMMONLY CARRIED

Amendments adopted at the ... of Experts

1. Addition of new entries

Substance or article		Hazards			Packing		Control temperature (°C)	Emergency temperature (°C)
Number	Name and description	Class division	Subsidiary risks	Special provisions	Group	Method		
0411	PENTAERYTHRITE TETRANITRATE (PETN) with, by weight, at least 7% wax	1.1 D	+	131		E 22(a)		
0412	CARTRIDGES FOR WEAPONS, with bursting charge	1.4 E	+			E 112		
0413	CARTRIDGES FOR WEAPONS, BLANK	1.2 C	+			E 112		
0414	CHARGES PROPELLING FOR CANNON	1.2 C	+			E 119		
0415	CHARGES PROPELLING FOR ROCKET MOTORS	1.2 C	-			E 22		
0416	CHARGES PROPELLING FOR ROCKET MOTORS, composite mixture	1.2 C	+			E 22		
0417	CARTRIDGES FOR WEAPONS, with INERT PROJECTILES	1.3 C	+			E 112		
0418	FLARES, SURFACE	1.1 G	+			E 133		
0419	FLARES, SURFACE	1.2 G	+			E 133		
0420	FLARES, AERIAL	1.1 G	+			E 133		
0421	FLARES, AERIAL	1.2 G	+			E 133		

I. Amendments

UN entry 0072:

for HEXOGENE read HEXOGEN

UN entry 0204:

for SOUNDING DEVICES, explosive read SOUNDING DEVICES, EXPLOSIVE

UN entry 0224:

Amend existing entry by read:

"BARIUM AZIDE, dry OR wetted with, by weight, less than 50 per cent water".

UN entry Nos. 0271, 0272, 0273 and 0274:

Amend packing method to read: "P 62"

UN entry 0323:

Delete synonym between brackets.

Chapter 3. SPECIAL PROVISIONS RELATING TO INDIVIDUAL SUBSTANCES AND ARTICLES

Add the following new special provision:

"131. The phlegmatized substance must be significantly less sensitive than dry PETN".

ANNEX 2

Chapter 4. SPECIAL RECOMMENDATIONS RELATING TO CLASS 1

Amendments adopted by the Group of Experts

Add a new sub-chapter:

"Carriage of explosives in freight containers"

preceding immediately the sub-chapter "Scheme of procedure whereby a product may be classed as an explosive and assigned a classification code" (page 133) and the following new paragraphs:

"4.12 Freight containers and transport vehicles should not be offered by a carrier or shipper for the carriage of explosives substances and articles of Class 1, unless the container or vehicle is structurally serviceable as witnessed by a current CSC approval plate (applicable to freight containers only) and a detailed visual examination as follows:

(a) Prior to loading a freight container or transport vehicle with explosives it should be checked to ensure it is free of any residue of previous cargo and to ensure it is structurally serviceable.

(b) Structurally serviceable means it cannot have major defects in its structural components; e.g. top and bottom side rails, top and bottom end rails, door sill and header, floor cross members, corner posts, and corner fittings in a freight container. Major defects are cuts or holes in the structural member greater than 10 mm in depth, regardless of length; cracks or breaks in structural members; more than one splice or improper splices (e.g. lapped splices) in top or bottom end rails or door headers or two splices in any one top or bottom side rail or any splice in a door sill; door hinges and hardware that are seized, twisted, broken, missing or otherwise inoperative; gaskets and seals that do not seat; and, for freight containers, any distortion of the over-all configuration great enough to prevent proper alignment of handling equipment, mounting and securing on chassis, rail car or truck, or insertion into ships' cells.

(c) In addition, deterioration in any component of the container or transport vehicle, regardless of the material of construction, such as rusted out metal in sidewalls or disintegrated fiberglass is unacceptable. Normal wear, however, including oxidation (rust), slight dents and scratches and other damage that does not affect serviceability or the weather-tight integrity of the units is acceptable.

4.13 All shipments of explosives of Division 1.1 and 1.2 should be accompanied by a statement, which may appear on the transport documentation, certifying that the transport unit is structurally serviceable as defined in paragraph 4.12 above."

Renumber paragraphs 4.12 to 4.68 as 4.14 to 4.70.

Paragraph 4.12 (d) (Renumbered as 4.14 (d))

Add and link to subparagraph 4.14 (d),

"A unit load consists of a number of suitable outer packages of compatible explosive substances or articles combined for ease of conveyance and is designed to be able to withstand the conditions associated with the appropriate modes of transport.

Such a unit load should be submitted to the classification procedure unless all the packages have an identical hazard classification code. The resultant hazard classification code should be applied to the unit load as a whole treating it as if it were a package for the purposes of marking and labelling in accordance with Chapter 13."

Paragraph 4.68 (Renumbered as 4.70)

Add the following new descriptions:

"Ammunition, practice

Practice ammunition does not carry the main bursting charge but will normally include a propelling charge, explosive train and small bursting charge."

"Ammunition, proof

This is ammunition used to test the performance or strength of new ammunition or weapon components or assemblies."

"Articles, explosive, n.o.s.

This category for articles, explosives not otherwise specified, should be used only when no other appropriate entry exists and, then only with the approval of the competent national authority."

Replace the three existing descriptions by:

"Articles, pyrophoric - Articles, which may contain both an explosive substance or component and a pyrophoric substance (one which is capable of spontaneous ignition when exposed to air). This definition is not intended to include articles containing white phosphorus.

Bombs, photo-flash - Explosive articles, dropped from aircraft to provide brief, intense illumination for photography.

Bursters - Cases charged with detonating or deflagrating explosive used to burst projectiles or bombs in order to project or disperse their contents. The burster is no larger than is required to burst the case and disseminate the contents."

Add the following new description:

"Bursting charge

An explosive charge designed to produce effect by blast or fragmentation."

Insert between "Bursting charge" and "cartridges":

Caps, percussion (see Primers, cap type)

Add the following new descriptions:

"Cartridges for weapons, blank

Consist of cartridge case with primer and propellant or black powder but no projectile. Used for training, saluting, propelling charge etc."

"Cartridges for weapons, with bursting charge (Group F)

These comprise a projectile with a bursting charge and a propelling charge, with means of initiation."

"Cartridges for weapons, with bursting charge (projectiles with propelling charge) (Group E)

These comprise a projectile with bursting charge and a propelling charge, without means of initiation."

"Cartridges for weapons, with inert projectile

These comprise a projectile without bursting charge but with a propelling charge and means of ignition."

Amend the following descriptions:

"Cartridges, oil well"

Read third sentence:

"Jet perforators and charges, shaped, commercial (see description)..."

"Cartridges, small arms"

Ninth line: for lacrymatory read lachrymatory

"Cartridges, starter, jet engine"

Last sentence should read: "See 'cartridges, power device'".

Add the following new descriptions:

"Charges, demolition

These consist of a secondary detonating explosive contained in a fibreboard, plastics, metal or other material casing."

"Charges, depth

These consist of secondary detonating explosive normally contained in a metal drum and are designed to detonate under water."

Amend the following descriptions:

"Charges, expelling, explosive, for fire extinguisher"

Last sentence should read: "See 'cartridges, power device'".

"Core, igniter"

First line, delete "quickly".

Add the following new descriptions:

"Cutters, cable, explosive

These consist of a device containing a knife-edged component which is propelled by a small charge of explosive."

"Expelling charge

An explosive charge designed to eject the payload from the parent article without damage."

"Flares, aerial

These are pyrotechnic devices which are dropped from aircraft and are designed to illuminate an area on the surface below."

Add the following new description:

"Flares, surface

These are pyrotechnic devices which are used to illuminate, identify, signal or warn."

Amend the following descriptions:

"Fracturing devices, for oil wells"

Second line: for round read around

"Fuse fuze"

Last line: for or fire or detonation read by deflagration or detonation

Add the following new descriptions:

"Grenades, hand or rifle

These are devices which are designed to be thrown by hand or to be projected by a rifle. Operational grenades contain a bursting charge.

Practice grenades contain the priming device and may contain a spotting charge."

"Mines, with bursting charge

These are normally metal or composition containers filled with a secondary detonating explosive, designed to be operated by the passage of ships, vehicles or personnel."

"Photo-flash powder in units

These consist of a pyrotechnic charge which, when ignited produces a light of sufficient intensity and duration for photographic purposes, or for stage effects."

Insert between "Primers for propelling charges" and "Projectiles":

Primers, tubular (see Primers for propelling charges)

Amend the following descriptions:

"Projectiles"

Ninth line: for terms read term

"Rocket motors"

Second line: for contained read contain

Add the following new descriptions:

"Rockets, with bursting charge

These consist of a rocket motor and an explosive warhead."

"Rockets, with inert head

These are fitted with motors which are normally ignited by electric primers or electric squibs."

Replacing existing description by:

Signal devices, hand - "Articles producing visual signals, including highway flares, small marine distress flares and railway fusees, containing pyrotechnic compositions and designed to signal or warn by means of flame, smoke, or a combination of both"."

Add the following new descriptions:

"Signals, ship distress

These contain pyrotechnic substances and are designed to produce signals by means of sound, flame or smoke or any combinations thereof. See also ammunition, illuminating."

"Signals, smoke, with explosive sound unit

These contain pyrotechnic substances which produce audible signals, in addition to coloured smoke signals."

"Substances, explosive, n.o.s.

It is intended that this category for substances, explosive, not otherwise specified should be used only when no other appropriate entry exists and, then, only with the approval of the competent national authority."

"Torpedoes, with bursting charge

These are devices containing a means of propulsion and a charge of secondary detonating explosive."

"Warheads, Rocket

An article containing secondary detonating explosives, designed to be fitted to a rocket. Guided-missile warheads are included in this description. Some warheads, rockets are fitted only with a burster or expelling charge."

Figure 4.1

Compatibility Group E, hazard division 1.4,

Insert entry "1.4 E"

Figure 4.2

Compatibility group B

Add at the end of the existing description:

"and not containing two or more independent safety features"

Compatibility group C

Delete "secondary" in the first line of the description.

Compatibility group D

Add at the end of the existing description:

"Articles containing a primary explosive substance and containing two or more separate safety features".

Annex 3

Chapter 4 - SPECIAL RECOMMENDATIONS RELATING TO CLASS 1

Flow Chart

The Group of Experts adopted the flow chart and the text reproduced below.

TESTS FOR CLASSIFICATION

Designation		Description of tests	Parameter or characteristic which is measured or determined	Examples of particular test apparatus or methods which are considered suitable (not exhaustive list)
Series	Type			
1 A	1 A(a)	A shock test with defined booster and confinement.	Propagation of detonation	BAM 50/60 steel tube test) instrumented TNO 50/70 steel tube test) for measuring United States gap test) the rate of) preparation
	1 A(b)	A combustion or thermal test	Thermal response	Koenen test United States internal ignition test United Kingdom time/pressure test United Kingdom sealed vessel test
	1 A(c)	A shock test without a booster	Power	Ballistic motor (Mark I, Mark III Trauzl test Extest) French CUP test
1 B	1 B(a)	A shock test with defined booster and confinement	Shock sensitivity	BAM 50/60 steel tube test) instrumented TNO 50/70 steel tube test) for measuring United States gap test) the rate of propagation
	1 B(b)	A combustion or thermal test	Thermal sensitivity	Koenen test United States internal ignition test United Kingdom time/pressure test United Kingdom small sealed vessel test
	1B(c)	Such other additional tests as may be required by the competent authorities		
2	2 (a)	An impact test	Sensitiveness to mechanical stimulus	United States Bureau of Explosives machine BAM machine United Kingdom Rotter test United Kingdom steel ball test

Designation		Description of tests	Parameter or characteristic which is measured or determined	Examples of particular test apparatus or methods which are considered suitable (not exhaustive list)
Series	Type			
	2 (b)	A friction test	Sensitiveness to mechanical stimulus	BAM machine United Kingdom "standard man" test United Kingdom PERME rotary friction machine
2	2 (c)	A stability test	Physical and chemical stability when subjected to thermal stimulus	Shell heat test United Nations test Differential thermal analysis (DTA) test Vacuum stability test
	2 (d)	A small scale fire test	Ease of DDT deflagration in small quantities when unconfined	United States small scale test United Kingdom Bickford fuse test
	2 (e)	An adiabatic compression test for liquids	Sensitiveness to pulsing or pumping action	United Kingdom "U" tube test
3	3 (a)	A shock test	Shock sensitivity of potentially Division 1.5 substances	Cap sensitivity test (United States or Federal Republic of Germany)
	3 (b)	A thermal test	Tendency for deflagration to detonation transition (DDT)	United States Deflagration to Detonation Transition test
	3 (c)	An external fire test	Tendency to ETC in fire	United Nations external fire test (bonfire test)

Remarks to the flow chart

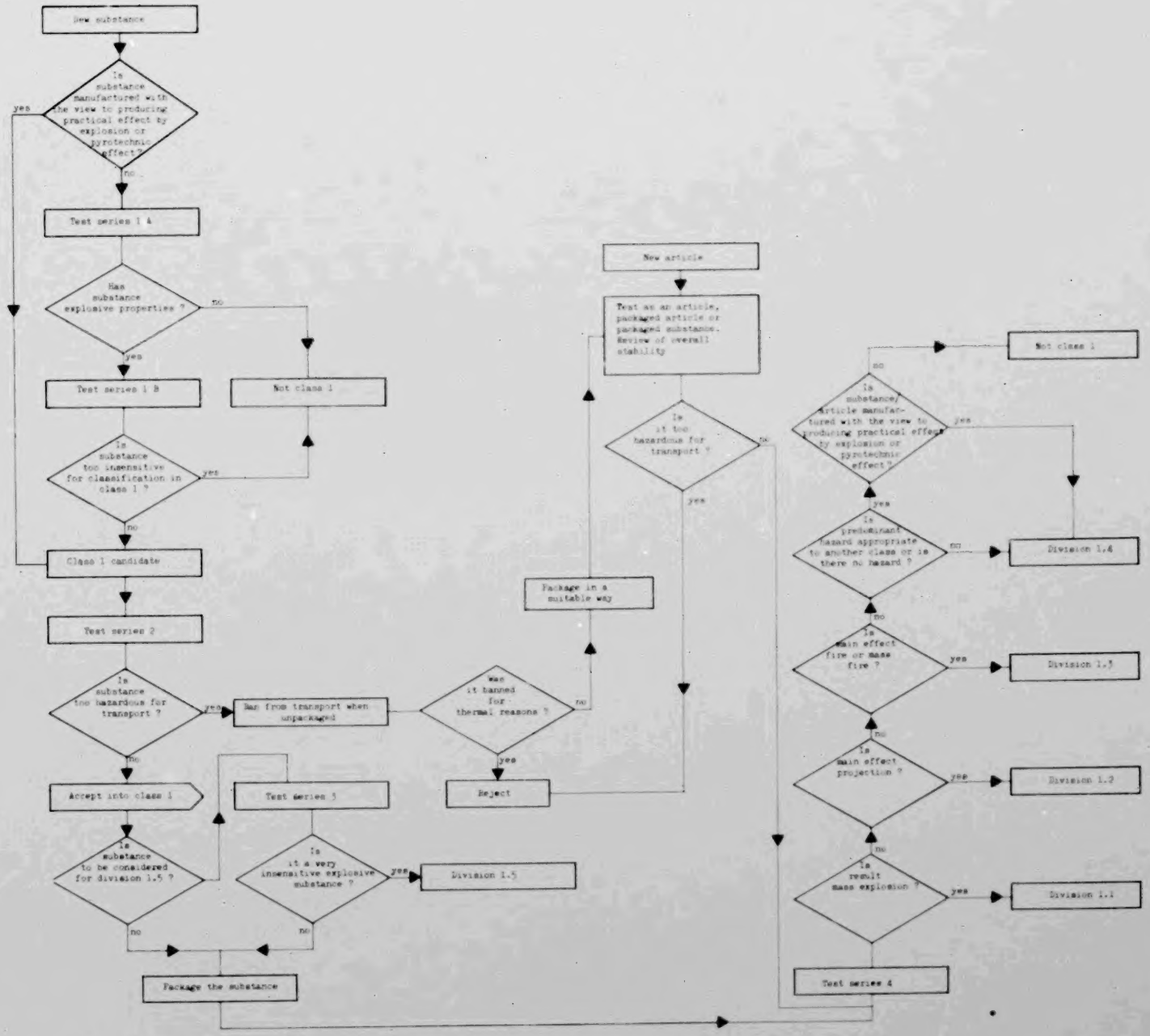
1. The flow chart is only for hazard classification.

   Before this classification, preliminary tests must be carried out to ensure adequate safety of personnel.

   The results of those tests could be used for the subsequent classification.

2. The flow chart is not specifically designed for the hazard classification of substances to be conveyed in bulk.

   Conveyance in bulk may require special tests which take into consideration the quantity (self-confinement) and kind of substance and the container for that substance. Such tests may be specified by the competent national authorities.


New substance
Is substance manufactured with the view to producing practical effect by explosion or pyrotechnic effect ?
yes
no
Test series 1 4
Has substance explosive properties ?
no
yes
Not class 1
Test series 1 B
Is substance too insensitive for classification in class 1 ?
yes
no
Class 1 candidate
Test series 2
Is substance too hazardous for transport ?
yes
Ban from transport when unpackaged
Was it banned for thermal reasons ?
no
yes
Reject
no
Accept into class 1
Test series 3
Is substance to be considered for division 1.5 ?
Is it a very insensitive explosive substance ?
yes
Division 1.5
no
no
Package the substance
New article
Test as an article, packaged article or packaged substance. Review of overall stability
Is it too hazardous for transport ?
no
yes
Package in a suitable way
Is substance/ article manufactured with the view to producing practical effect by explosion or pyrotechnic effect ?
yes
no
Not class 1
Is predominant hazard appropriate to another class or is there no hazard ?
no
Division 1.6
yes
Is main effect fire or mass fire ?
yes
Division 1.3
no
Is main effect projection ?
yes
Division 1.2
no
Is result mass explosion ?
yes
Division 1.1
no
Test series 4

Annex 4

Chapter 10. SPECIAL RECOMMENDATIONS ON PACKING FOR CLASS 1
(ST/SG/AC.10/4/Add.3)

Amendments adopted by the Group of Experts

Packing method E 2

Amend column 4 to read:

"1 for all substances,

2 for all except 0400"

Packing method E 9 (b)

becomes E 9

Add in column 3, under "plastics fabrics (5H1)"

"plastics film (5H2)"

Read text in parenthesis

"(If bags 5H1B, 5H1C or 5H2 are used no inner packaging is necessary)".

Packing method E 22 (a)

Add in column 4:

"5 and 11 for 0411"

Packing method E 23

Delete

Annex 5

INDEX

Amendments adopted by the Group of Experts on Explosives

1. New entries

Amorces (caps, igniting), see	1.4 G	0336
	1.4 S	0337
Cartridges*, actuating, for fire extinguisher or operating valve, explosive, see	1.2 C	0381
	1.3 C	0275
	1.4 C	0276
	1.4 S	0323
Bursting charge, see	(to be completed)	
CARTRIDGES FOR WEAPONS*, BLANK	1.2 C	0413
CARTRIDGES FOR WEAPONS*, with bursting charge	1.4 E	0412
CARTRIDGES FOR WEAPONS*, with INERT PROJECTILES	1.3 C	0417
Cartridges*, sporting, see	1.4 S	0014
Cartridges*, starter, jet engine, see	1.2 C	0381
	1.3 C	0275
	1.4 C	0276
	1.4 S	0323
Charges*, expelling, explosive, for fire extinguishers, see	1.2 C	0381
	1.3 C	0275
	1.4 C	0276
	1.4 S	0323
CHARGES*, PROPELLING, FOR CANNON	1.2 C	0414
CHARGES*, PROPELLING, FOR ROCKET MOTORS	1.2 C	0415
CHARGES*, PROPELLING, FOR ROCKET MOTORS composite mixture	1.2 C	0416

Expelling charge, see	(to be completed)	
FLARES, SURFACE	1.1 G	0418
	1.2 G	0419
FLARES, AERIAL	1.1 G	0420
	1.2 G	0421
PENTAERYTHRITE TETRANITRATE (PETN) with, by weight, at least 7% wax	1.1 D	0411
PETN, see	1.1 D	0411
Power* devices, explosive, see	1.2 C	0381
	1.3 C	0275
	1.4 C	0276
	1.4 S	0325

2. Amendments

Page 320, second column

"Ammonium nitrate explosives, see ...", add "1.5 D 0331"

Page 322, first column

"Ammunition SA"

for 1.4 C 0323 read 1.4 C 0339

Page 324, second column, third entry

Add to existing entry "Bangalore torpedoes", "1.1 D 0043"

Page 324, second column, seventh entry

Amend as:

BARIUM AZIDE, dry or wetted with, by weight, less than 50 per cent water	1.1 A	0224

Page 331, second column

"Cartridge cases, empty, primed, see ...."

Add: "1.4 C 0379"

Page 332, first column

"CASES, CARTRIDGES, EMPTY, WITH PRIMER"

for cartridges read cartridge

Page 336, first column

"CORD (FUSE), DETONATING, metal clad*, MILD EFFECT"

for 1.4 G 0104 read 1.4 D 0104

Page 347

for "GRENADES, hand or rifle, PRACTICE" read "GRENADES PRACTICE, hand or rifle"

Page 348, second column, first entry, delete:

"(Hexogen mixed with Trinitrotoluene and aluminium)"

Page 348, second column, third entry

for HEXOGENE read HEXOGEN

Page 368

"SIGNAL DEVICES, HAND*"

Add: "1.4 S 0373"

"SIGNALS, ship DISTRESS (other than water-activated contrivances)"

Add: "1.3 G 0195"